

Photonics for hydrogen energy research

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Advanced spectroscopy for hydrogen

- **Hydrogen Purity Analysis:**

Assess hydrogen purity by detecting impurities that can affect fuel cell performance

- **Monitoring Catalysts:**

Understanding and improving catalysts used in hydrogen production processes

- **In-situ Spectroscopy:**

Real-time monitoring of chemical reactions and processes in hydrogen production and storage

- **Solar Hydrogen Production:**

Development of photocatalysts for solar-driven hydrogen production

- **Safety and Leak Detection:**

Rapid detection of hydrogen leaks

1. Advanced material characterization for green H₂ chain

THz spectroscopy

for chemo-sensitive non-invasive material inspection:

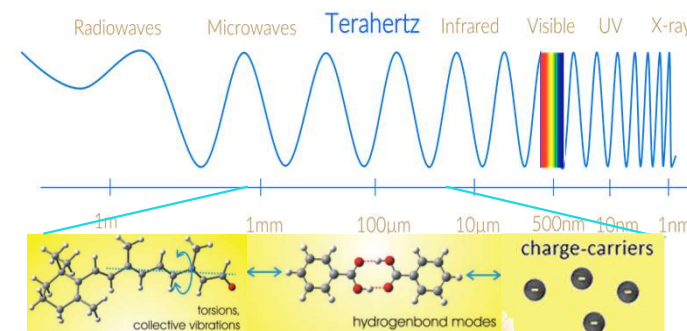
inspection of materials for green H₂ chain and CO₂ capturing
graphene from PET pyrolysis, perovskites, MOFs

biomass gasification

gas sensing, syngas/sorbent interaction to maximise H₂ gas

purification efficiency

investigation of THz assisted process for H₂ production



Un progetto di:



ASSOLOMBARDA



2. Raman analysis of gas mixture

- Full-optical technique giving the gas mixture composition: methane and other hydrocarbons, hydrogen, carbon dioxide, nitrogen
- From mixture composition, all the measurements required by the Italian law for natural gas diagnostics are obtained:
 - Calorific Power [kJ/m³], i.e., the amount of ENERGY in form of heat released by the combustion of a specific volume of the mixture
 - amount of carbon dioxide
 - amount of hydrogen (in view of possible hydrogen blending)
- Measurements defined by ISO 6976:2016 standard and OIML R 140 recommendation

